

Amendment to the Drawing

Please amend Sheet 1 by replacing it with the accompanying Replacement Sheet 1, on which **Fig. 1** has been corrected so that the vertex for 100% LiNiO_2 is labeled as vertex “C” rather than “D”. Support for this correction may be found at, e.g., paragraph 0019 of the written description, whose third sentence says that “**Fig. 1** is a triangular pyramidal plot whose vertices A, B, C and D respectively represent the compositions LiCoO_2 , LiMnO_2 , LiNiO_2 and $\text{Li}(\text{Li}_{1/3}\text{Mn}_{2/3})\text{O}_2$ ”.

Remarks

Applicants have editorially amended the Specification and Drawing and canceled claims 18-21 without prejudice as shown above. Following entry of this amendment, claims 1-17 will be pending in this application.

Rejections of Claims 19 and 21 Under 35 U.S.C. §102

Claims 19 and 21 were rejected under 35 U.S.C. §102(b) as being anticipated by the article titled "Structure and Electrochemistry of $\text{Li}[\text{Ni}_x\text{Co}_{1-2x}\text{Mn}_x]\text{O}_2$ ($0 \leq x \leq 1/2$)" by MacNeil et al. published in the J of the Electrochem. Soc. 149 (10) A1332-A1336 (2002), available electronically Aug. 21, 2002. Claims 19 and 21 were also rejected under 35 U.S.C. §102(b) as being anticipated by the article titled "Layered Lithium Insertion Material of $\text{LiCo}_{1/3}\text{Ni}_{1/3}\text{Mn}_{1/3}\text{O}_2$ for Lithium-Ion Batteries" by Ohzuku et al. published in Chem. Letters (2001) pgs. 642-643. The cancellation of claims 19 and 21 renders these rejections moot.

Rejection of Claims 1-21 Under 35 USC §103

Claims 1-21 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application Publication No. US 2003/0027048 A1 (Lu et al.), on grounds that:

"The Lu et al. publication in paragraph no. 0003 describes a cathode composition for a lithium ion battery of the general formula: $\text{Li}[M^I_{(1-x)}\text{Mn}_x]\text{O}_2$ where $0 < x < 1$ and M^I represents one or more metals other than chromium (examples of suitable metals include Ni, Co, Fe, Cu, Li, Zn, V and combinations thereof; please see paragraph no. 0024). The composition is in the form of a single phase having an O3 crystal structure. The Lu et al. publication is also directed to lithium ion batteries incorporating these cathode compositions in combination with an anode and an electrolyte.

"Paragraph no. 0023 sets forth that the cathode composition may be synthesized by jet milling or by combining precursors of the metal elements (e.g.

hydroxides, nitrates and the like), followed by heating at temperatures of at least 600 °C.

“The difference between the applicants' claims and this Lu et al., publication is that Lu et al. broadly discloses that M may be at least one selected from Ni Co, Fe, Cu, Li, Zn, V and combinations thereof whereas the applicants' claims call for M to be both Ni and Co, however it is submitted that this difference would have been obvious to one of ordinary skill in the art at the time the invention was made because the courts have already determined that such selection of a particular member out of a prior art reference's group of members is prima facie obvious: please see the discussion of the In re Petering 301 F.2d 676, 681, 133 USPQ 275, 280 (CCPA 1962) court decision set forth in section 2144.08(II)(A)(4)(a) in the MPEP 8th Ed, Rev. 3, Aug. 2005.” (see the Office Action at pages 4-5).

Reconsideration is requested. Process claims 1-17 are at issue. These claims involve making single-phase “four metal” cathode compounds (see paragraph 0003) using a wet milling step and a heating step.

Lu et al. say in their paragraph 0023 that:

“[0023] The cathode compositions may be synthesized by jet milling or by combining precursors of the metal elements (e.g., hydroxides, nitrates, and the like), followed by heating to generate the cathode composition.”

Lu et al. use coprecipitation of mixed metal nitrates and metal hydroxides to make single-phase four metal cathode compounds in their Examples 19 and 20.

As noted in applicants' paragraph 0006:

“Wet milling provides significantly shorter milling times than dry milling and appears to promote formation of single-phase lithium-transition metal oxide compounds. The time savings in the wet milling step more than offsets the time that may be required to dry the slurry during the heating step.”

Applicants' Examples 1 and 2 show the use of wet milling to obtain single-phase four metal cathode compounds. Applicants' Comparison Example 1 shows that when the Example 1 starting powders were dry milled, a compound exhibiting at least two phases by powder x-ray diffraction (XRD) analysis was obtained. Applicants' Comparison Example 2 shows that a

single-phase four metal compound like that prepared in applicants' Example 1 could be made by coprecipitation of mixed metal nitrates and metal hydroxides, but that doing so required lengthy washing and drying steps which were not needed in Example 1 and Example 2.

Applicants' rejected claims 1-17 are patentable over Lu et al. Applicants accordingly request withdrawal of the 35 USC §102(b) rejection of Claims 1-17 as being unpatentable over Lu et al.

Rejection of Claims 1 – 21 for Double Patenting

Claims 1-21 were provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of copending Application Serial No. 10/757,645, on grounds set out at pages 5-7 of the Office Action. The recited grounds for the double patenting rejection appear mainly to dwell on the respective application composition claims. Reconsideration is requested.

The '645 application claims priority to Provisional Application Serial No. 60/454,884 filed March 14, 2003 (approximately 8 months prior to the present application's filing date). Assuming solely for the sake of argument that the '645 application could be cited against the prior application, that citation would be based on 35 U.S.C. §103(e). The '645 application and the present application were, at the time the present invention was made, owned by or subject to an obligation of assignment to the same entity, namely 3M Innovative Properties Company. Pursuant to 35 U.S.C. §103(c), the '645 application would not preclude patentability of the claims in the present application and the nonstatutory obviousness-type double patenting rejection should be withdrawn, see MPEP §804.02, 804.04 and form paragraph 7.21.02.

If the above argument is not deemed sufficient to overcome the double patenting rejection, applicants desire consideration of the following additional argument. Process claims 1-17 are at issue in the present application. The '645 application includes method claims 1-15 and lithium transition metal oxide claims 16-19. '645 application method claims 2-15 depend from method claim 1. For the convenience of the Examiner, claim 1 in the '645 application reads as follows:

1. A method of producing $\text{Li}_y[\text{Ni}_x\text{Co}_{1-2x}\text{Mn}_x]\text{O}_2$ wherein $0.025 \leq x \leq 0.45$, and $0.9 \leq y \leq 1.3$, the method comprising:

mixing $[\text{Ni}_x\text{Co}_{1-2x}\text{Mn}_x]\text{OH}_2$ with LiOH or Li_2CO_3 and one or both of alkali metal fluorides and boron compounds as sintering agent; and
heating the resulting mixture until a sufficiently dense composition of $\text{Li}_y[\text{Ni}_x\text{Co}_{1-2x}\text{Mn}_x]\text{O}_2$ is obtained for use in a lithium-ion battery.

Applicants submit that an adequate line of demarcation has been maintained between process claims 1-17 in the present application and method claims 1-15 in the '645 application.


Applicants accordingly request withdrawal of the double patenting rejection.

CONCLUSION

Applicants have made an earnest effort to resolve all issues and to place the application in condition for allowance. The Examiner is encouraged to call the undersigned attorney if there are any questions or suggestions regarding this amendment or the application.

Respectfully submitted on behalf of
3M Innovative Properties Company,

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